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CASE REPORT / ПРИКАЗ БОЛЕСНИКА

Necrotising fascitis – a life-threatening infection: case reports and literature review

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SUMMARY

Introduction Necrotizing fasciitis is a rare, severe, aggressive infection, life-threatening surgical emergency that spreads quickly, characterized by extensive necrosis of the deep and superficial fascia, associated with significant morbidity and mortality.

Case outline We are presenting two case reports with necrotizing fasciitis: a 54-year-old male patient, obese, with hypertension and untreated perianal fistula with severe infection of perianal region, perineum and scrotum, and a 64-year-old female patient with diabetes mellitus and heart disease, with severe infection of the lower extremity, anterior abdominal wall, inguinal and gluteal region, in which the entry point of infection were microlesions of the skin after shaving. Both patients were treated by emergency extensive surgical necrectomy with eradication of the deep infection source, with all conservative treatment measures. One patient was treated with hyperbaric oxygen therapy, the other was not because of cardiac and pulmonary contraindications.

Conclusion Better treatment outcome requires a multidisciplinary approach (cardiologist, endocrinologist, nephrologist, orthopedist, surgeon). Rapid and extensive surgical necrectomy is necessary to increase the success of the treatment of patients with this infection.

Keywords: necrotizing fasciitis, surgical debridement, severe infection

INTRODUCTION

Necrotizing fasciitis (NF) is a rare, severe, bacterial life-threatening infection, characterized by spreading rapidly, affecting subcutaneous tissue, fascia and sometimes muscles, an infection with high mortality rate, especially in patients with comorbidities [1].

The incidence of this infection is 1–4/100.000 persons per year. Many studies present different mortality data for NF, but what they have in common is that it is still extremely high [1, 2, 3]. In a population-based study in the United States, it was reported that overall mortality was 7.5%. Some studies reported mortality rate up to 70% with higher rates in underdeveloped countries. The modern new studies report mortality rate between 20–40% [4].

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CASE REPORT 1

In September 2019, a 54-year-old man was admitted to the Department of General Surgery at the General hospital of Novi Pazar. The patient was febrile, languid, hypotensive, tachycardic, obese, with changes on the skin of the perianal region, about 3 × 3 cm in size, a slight bullous change on the surface and palpatory evident tissue fluctuation below the change. History of the present illness: untreated perianal fistula. Past medical history was positive for hypertension.

When admitted, an incision was made and a large amount of green-brown liquid content was obtained with an extremely unpleasant odor. Laboratory findings during hospitalization are shown in Table 1. Intensive conservative treatment started with empirical antibiotics (ceftriaxone, gentamicin, and metronidazole), insulin therapy, fluid replacement, analgesics, and other supportive therapy, with monitoring of vital parameters. After 24 hours of treatment erythematous changes occurred on the skin with obvious rapid spread of infection to the perineum and scrotum, as well as to both gluteal regions, also increased local pain, biochemical inflammatory parameters and development of clinical signs of sepsis (s-Procalcitonin 21.08, The Laboratory Risk Indicator for Necrotizing Fasciitis (LRINEC) score 11). Extensive surgical excision of the infected parts of the perianal region, broadly into each gluteal region was made, as well as excision of scrotal skin with opening of all testicular sheaths and opening inguinal canals on both sides. The wound was left to heal *per secundam intentionem* (Figure 1).

A wound swab taken for microbiological analysis was positive for Klebsiella spp. Treatment was continued with antibiotics (imipenem, vancomycin, and metronidazole) and regular wound dressing two to three times daily.

Postoperatively, 48 hours after surgical reintervention, necrectomy, was performed. On the fifth postoperative day there was a worsening of the patient's general condition which was

Table 1. Laboratory parameters during the hospitalization

Parameters	Patient 1			Patient 2		
	Day 1	Day 2	Day 7	Day 1	Day 2	Day 7
Glycemia (mmol/L)	41	20	12	32	24	10
CRP (mg/L)	403.7	397	134	350	305	140
Creatinine (μmol/L)	222	160	103	158	142	122
Urea (mmol/L)	26.8	23	19	24	20	12
Na+ (mmol/L)	135	134	135	135	133	136
WBC (10^9/L)	26	28	16	27	23	15
RBC (10^{12}/L)	4.08	3.81	3.21	4.34	4.01	3.98
HGB (g/L)	121	114	101	129	123	124

Figure 1. Infection of scrotum and perineum after surgical necrectomy

Figure 2. At the end of the treatment for patient 1

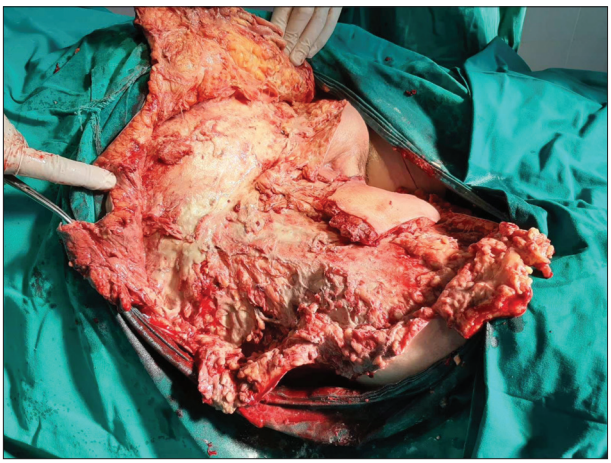

Figure 3. Local status of infected area in the beginning of treatment

complicated by the appearance of pulmonary edema and heart failure. After the improvement of the general condition, on the 10th postoperative day, hemodynamically stable, with neat vital parameters, the patient was transported to a tertiary health care institution for treatment with hyperbaric oxygen therapy (HBOT). Prior to HBOT, colon surgery was performed according to Hartman procedure. He was treated in a tertiary institution for 40 days after which he was discharged for outpatient treatment with a regular wound toilet and occasional surgeon's control. Four months following the treatment the patient had fully recovered (Figure 2).

CASE REPORT 2

In September 2019, a 64-year-old female patient was admitted to the Department of General Surgery at the General Hospital of Novi Pazar. On admission she was febrile, languid, hemodynamically unstable, with pretibial edema, septic, less mobile. For over 15 years she has been a diabetic on insulin therapy.

On admission, an infection of the skin of the groin region on the right, about 6 × 2 cm in size, was noticed, where the skin was erythematous, painful, with the presence of subcutaneous air enhancements.

Biochemical parameters during hospitalization are shown in Table 1 (s-Procalcitonin 23.12, LRINEC score 10). Four hours after admission an extensive excision of the skin and subcutaneous tissue was made, all the way to the fascia of right femoral and pubic region, anterior abdominal wall in the infraumbilical region, pubic and right gluteal region, to the macroscopically visible healthy tissue (Figure 3). The wound was left to heal *per secundam intentionem*. After necrectomy antibiotic treatment was started: imipenem, vancomycin, and metronidazole, and other supportive therapy with daily wound toileting, two to three times a day.

Postoperatively, a decrease in biochemical inflammatory parameters occurs. Surgical reintervention, necrectomia, 48 hours after the first surgery, was performed. Microbiologically isolated *Pseudomonas aeruginosa* in the

Figure 4. At the end of the treatment for patient 2

wound swab was sensitive to administered antibiotics. HBOT treatment was not performed due to cardiac and pulmonary contraindications. On the control swab the microbiological findings showed *Staphylococcus aureus* and *Klebsiella spp*. Due to a large skin defect, to prevent skin contracture, situational sutures were repeatedly placed on the skin (Figure 4) but to no avail. The patient was in good general condition, neat vital parameters, no local signs of infection, and after 45 days of hospitalization, the skin defect was reconstructed by a plastic surgeon.

We obtained verbal and written consent from the patients to publish the case report. This article was planned in compliance with the Patient Rights Directive and ethical rules by considering the principles of the Declaration of Helsinki.

DISCUSSION

NF is severe and potentially fatal, aggressive infection associated with significant morbidity and mortality. Some literature data reported that the prevalence of NF is about 1–4 cases per 100,000 populations; men are commonly affected, with a male-to-female ratio of 3:1 [1]. However, there are studies showing different results, so, male to female ratio by Eke et al. [5] is approximately 10:1, and in the study of Kim et al. [6], men accounted for 67.1%.

Most commonly, it is a polymicrobial infection caused by aerobic and anaerobic bacteria, most commonly from the genitourinary and digestive tract, but also from the skin [7]. However, some recent studies suggests that the prevalence of monomicrobial NF is as high as 60–80% [8]. Tsai et al. [8] state that the infections have more rapid and fulminant form if they are caused by Gram-negative microorganisms. Jabbour et al. [9] state that *Pseudomonas* and *Proteus* infections were the most commonly associated microorganisms among non-survivors in their study.

In presented cases, *Pseudomonas* and *Klebsiella* were isolated as the only pathogenic microorganisms.

There is no age predilection for NF, but patient age is a significant predictive factor for treatment outcome. Middle-aged patients as well as those over 50 years of age are more likely to be infected [10], have a worse prognosis, especially if they have accompanying comorbidities [1, 11]. In the study by Chalya et al. [11], the median age of patients was 34 years, while Schröder et al. [12] analyzed the occurrence of NF in children [13]. Advanced age is independent and strong predictor of mortality, mainly due to the increased incidence of comorbidities.

Diabetes mellitus is the most common comorbidity in patients with NF, and in addition to it, there are chronic alcoholism, chronic renal failure, arterial hypertension, immunosuppression, systemic disorders, cirrhosis, obesity, local trauma. Jabbour et al. [9] stated that in their study diabetes was present in 64%, followed by hypertension and renal impairment, and compared to a survivor group, these comorbidities were higher among non-survivors. In a study by Tarchouli et al. [10], diabetes was present in 38% of the cases and the mortality rate in heart disease was significantly higher. In the study of van Stigt et al. [14] the most frequent comorbidity was cardiovascular disease.

The disease usually involves anterior abdominal wall (20%), the scrotum (30%), and perineum (50%) [1].

Patients usually have symptoms that manifest as local pain, fever, malaise, hypotension, and poor general condition. Tissue swelling, erythema, crepitations, odor, skin necrosis, bullous changes can be seen. What is important is that the visible change of the skin is much smaller than the tissue infection under the skin, so it is necessary to recognize NF when the cutaneous changes are small. Mitchell et al. [15] reported that the lower limb was the most frequent site of infection, with 53%, and severe pain (76%) and swelling (83%) were the most common presenting features. Jabbour et al. [9] stated that the lower limb/thigh (53%) was the most frequent site of infection, followed by perineum (25%), and the sacral region had significantly higher frequency in non-survivors. Misiakos et al. [13] stated, the mostly infected site was perineum (46.8%), then lower limbs (35.5%), diabetes mellitus was the most common comorbidity (40.3%) and tenderness and local pain were the most common symptoms.

The symptomatology and local indicators of the infection in our cases mainly coincide with the literature data. Both patients were admitted in a serious condition with both local and systemic symptoms. The first patient presented with a history of comorbidity: irregularly treated arterial hypertension was only reported, while he also suffered from untreated perianal fistula and obesity (BMI 37.6). A percussion abscess was present from which the infection may have spread. The second patient was a cardiac patient with a long history of diabetes, on insulin therapy, with signs of diabetic angiopathy and neuropathy. Locally, in the groin region, after shaving a skin infection occurred with liquid secretion and unpleasant odor, and the infection began to spread.

For successful treatment of NF timely diagnosis or suspicion of NF, aggressive resuscitation of the patient, broad spectrum antibiotics administration, and early and radical surgical intervention are essential. A diagnosis is generally based on a clinical presentation. Laboratory tests and radiological imaging have a significant place in infection severity prediction and treatment outcome [16, 17, 18].

This is why scoring systems have been developed as predictors of the severity of infection. LRINEC is a scoring system designed to differentiate NF from other soft tissue infections [13]. The LRINEC score for the first patient was 11 and 10 for the second patient, which put them in the high-risk group.

Urgent and radical surgical treatment, with removal of necrotic and devitalized tissue, is mandatory and a major factor for good outcome in patients with NF. The mortality rate can be nine times greater when primary surgery is performed 24 hours after the onset of symptoms [13]. Several studies stated that all patients underwent 1–10 radical surgical debridement, with an average of 2.5 [1]. HBOT is a useful procedure for some infections, but it has not been proved that it is essential part of the treatment [1].

Both our patients were with a high LRINEC score, probably due to late arrival for a surgical examination. Radical surgical intervention was done 24 hours after admission in the first case and four hours after admission in the second. In both cases, surgical reinterventions were performed, but in the first case colon surgery (according to Hartman) was necessary due to rectal necrosis. HBOT was used in the first patient, however not in the second because of contraindications. In both cases intensive measures of conservative treatment and intravenous administration of antibiotics were applied. In both cases there was a complete recovery of the patients.

NF continues to be a serious disease with a high mortality rate and challenging diagnosis. Surgeons must be aware of the importance of rapid diagnosis and treatment to prevent mortality.

Conflict of Interests: None declared.

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Некротизирајући фасцитис – инфекција опасна по живот: прикази болесника и преглед литературе

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САЖЕТАК

Увод Некротизирајући фасцитис је ретка, тешка и агресивна инфекција која се брзо шири и представља хируршко стање опасно по живот, карактерише се опсежном некрозом дубоких и површинских фасција и повезана је са значајним морбидитетом и смртношћу.

Прикази болесника Представљамо два случаја некротизирајућих фасцитиса: 54-годишњег болесника, гојазног, с хипертензијом и нелеченом перианалном фистулом, с тешком инфекцијом перианалне регије, перинеума и скротума, и 64-годишњу болесницу са дијабетесом мелитусом и срчаном болешћу, с тешком инфекцијом доњег екстремитета, предњег трбушног зида, ингвиналне и глутеалне регије, код које су улазно место инфекције представљале микролезије коже после бријања. Оба болесника лечена су хитном опсежном хируршком некректомијом, уз ерадикацију извора инфекције, и уз све мере конзервативног лечења. Први болесник је лечен и хипербаричном терапијом кисеоником, а други не, због срчаних и плућних контраиндикација.

Закључак Бољи исход лечења захтева мултидисциплинарни приступ (кардиолог, ендокринолог, нефролог, ортопед, хирург). Потребна је брза и опсежна хируршка некректомија како би се повећао успех лечења болесника с овом инфекцијом.

Кључне речи: некротизирајући фасцитис; хируршки дебридман; тешка инфекција